



**JOINT BASE CHARLESTON-AIR  
ENVIRONMENTAL RESTORATION PROGRAM  
NORTH CHARLESTON, SOUTH CAROLINA**



**STATEMENT OF BASIS FOR LONG-TERM GROUNDWATER MONITORING WITH  
LAND USE CONTROLS**

**SOLID WASTE MANAGEMENT UNIT 66 (LF004)  
LANDFILL AREA NO. 1**

**STATEMENT OF BASIS**

**Joint Base Charleston-Air  
North Charleston, South Carolina**

**Facility/Unit Type:** Joint Base Charleston-Air (JBCA)/Solid Waste Management Unit (SWMU) 66 (LF004) Landfill Area No. 1

**Contaminants:** Metals

**Media:** Groundwater

**Proposed Remedy:** Long-Term Groundwater Monitoring (LTM) with Land Use Controls (LUCs)

**INTRODUCTION**

This Statement of Basis (SoB) proposes LTM with LUCs as the final remedy decision for SWMU 66 (LF004, also referred to as the site). It also provides background information for the site, explains the rationale for proposing LTM with LUCs as the final remedy, and invites the public to comment on this proposal. The South Carolina Department of Health and Environmental Control (SCDHEC) will not finalize this decision until the public comment period has ended and all information submitted during the public comment period has been reviewed and considered.

JBCA (also referred to as the Base) is located in Charleston County, approximately 10 miles northwest of Charleston, South Carolina (see **Figure 1**). JBCA comprises 3,731 acres of contiguous property with a Base population of approximately 8,500.

Air Force Environmental Restoration Program (ERP) Site SWMU 66 (LF004) – Landfill Area No. 1 is included in the JBCA Resource Conservation and Recovery Act (RCRA) Permit #SC3 570 024 460, dated October 4, 2010 (Permit). The Permit, issued by SCDHEC, lists SWMU 66 as requiring a RCRA Facility Investigation (RFI).

SWMU 66 was historically used as a landfill from 1953 until 1955 receiving an estimated 40,000 cubic yards of general refuse and, due to practices widely accepted at that time, potentially received minor amounts of industrial wastes such as paints, solvents, and batteries. Landfilled materials remain in place and periodic groundwater sampling is conducted so that if any degradation of groundwater quality was to occur due to waste left in place, it would be detected and appropriate action would be taken.

This SoB should not be considered the primary source of site information. Documents providing greater site detail are located in the administrative record maintained at JBCA and the SCDHEC office located in Columbia, South Carolina (addresses provided at the conclusion of this document). SCDHEC encourages the public to review these documents to gain a more thorough understanding of the site and the activities that have been conducted. A list of key site-specific documents used to prepare this SoB follows:

- Installation Restoration Program Phase I – Records Search (Preliminary Assessment), Charleston Air Force Base, South Carolina, Engineering Science, October 1983. This site was identified as potentially containing hazardous contaminants resulting from past Base activities.
- Revised Draft Installation Restoration Program Phase II – Stage 1 Confirmation/Quantification, Charleston Air Force Base, South Carolina, Science Application International Corporation (SAIC), April 1988.

- Installation Restoration Program Draft RCRA Facility Investigation Report for Charleston Air Force Base, South Carolina, Halliburton NUS Corporation, June 1995.
- Phase II RFI Report for Solid Waste Management Units 53, 58, 60, 66, 69, 70, and 71, Charleston Air Force Base, Charleston, South Carolina, Tetra Tech NUS, Inc., August 2007.
- Draft Final Phase III RCRA Facility Investigation Report, SWMU 66 – LF004 – Landfill Area No. 1, Joint Base Charleston-Air, North Charleston, South Carolina, URS Group, Inc. (URS), January 2015.
- Final Focused Corrective Measures Study and Annual Groundwater Monitoring Report, SWMU 66 – LF004 – Landfill Area No. 1 and SWMU 67 – LF017- Landfill Area No. 2, URS, March 2017.

## **PROPOSED REMEDY DECISION**

The proposed remedy decision for SWMU 66 is LTM with LUCs, which was selected through a Focused Corrective Measures Study (CMS) discussed below after the Phase III RFI Report identified numerous metals at concentrations that exceeded human health screening levels (HHSs) but which were below established Base background levels (SCDHEC, May 15, 2000). The Focused CMS also developed the corrective action objective for SWMU 66: to continue to protect human health and the environment by eliminating or minimizing the potential for exposure to constituents of concern (COCs) in underlying groundwater above their respective HHSs. The SCDHEC Bureau of Land and Waste Management, Division of Waste Management, RCRA Federal Facilities Section concurred with the remedy decision in a letter dated May 18, 2017 (SCDHEC, 2017).

There is no direct citation in the SCDHEC regulations stipulating that periodic groundwater monitoring be conducted for a landfill site with waste left in place even if there are no identified COCs. The monitoring requirement is implied by the SCDHEC Pollution Control Act (groundwater is to be restored to un-impacted conditions) (South Carolina Law, Title 48, Chapter 1), South Carolina Hazardous Waste Management Regulations (R.61-79), JBCA RCRA Part B Permit, United States Environmental Protection Agency's (USEPA's) Presumptive Remedy for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Landfill Sites (Directive No. 9355.0-49FS), and USEPA's Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (Directive No. 9355.0-67FS).

## **SITE DESCRIPTION**

SWMU 66, also known as LF004, Landfill Area No. 1, is located on the western side of JBCA, within the Base golf course. Golf Course Creek, which is located along the northern site boundary, acts as a hydrologic boundary that separates SWMU 66 from former landfill SWMU 67, also referred to as LF017. A portion of Golf Course Creek is concrete-lined, and water in the creek flows to the west. The former landfill was capped with an earthen cover and currently features a groomed vegetative cover (Engineering Science, 1983). **Figure 2** presents the site area, the approximate boundary of the former landfill, and the LUC boundary.

The site has been the subject of a LTM program since approximately 2008. Site groundwater monitoring wells are sampled annually for field parameters and metals. LUCs have not been officially implemented at SWMU 66; however, the groundwater in the vicinity of the site is not used for drinking water purposes and annual inspections are conducted to assess the integrity of the cover, including inspections for signs of erosion.

## **PREVIOUS INVESTIGATIONS**

### **Installation Restoration Program Phases I and II**

SWMU 66 was originally identified during a records search performed in 1983 by Engineering Science. This was followed by a field investigation in 1985 that included the installation and sampling of groundwater monitoring wells, as well as sampling and analysis of sediment and surface water. Iron was detected in groundwater above the applicable standards. In addition, several metals and volatile organic compounds (VOCs) were detected in sediment and surface water at concentrations above the applicable standards. However, it was determined that the landfill was not the source of the contaminants detected in site media (SAIC, 1988). In 1990, a second phase of Installation Restoration Program investigation was

performed, that included installing and sampling additional wells. Total petroleum hydrocarbons and VOCs were not detected in any of the wells sampled (Versar, 1991).

### **Phase I RFI**

In 1992 and 1994, a Phase I RFI was conducted at SWMU 66 and the resulting report documented field activities and summarized previous investigations. The RFI field activities included collecting soil, groundwater, surface water, and sediment samples and testing the hydraulic characteristics of the water-table aquifer beneath the site. Sampling locations are shown on **Figure 2**. Samples were analyzed for VOCs, semi-volatile organic compounds, herbicides, metals, pesticides, and polychlorinated biphenyls. As a result of the RFI, no further action (NFA) was recommended for SWMU 66 because contaminants were detected at concentrations that did not pose a human health threat to potential receptors under current or future potential land use conditions (Halliburton NUS Corporation, 1995). In September 1995, JBCA submitted a Technical Decision Document to Support NFA at SWMU 66. The decision document submittal was based on the quantitative risk assessment which indicated that no adverse effects were anticipated based on current or future land use scenarios. Upon review of the decision document, Region 4 of the USEPA determined that insufficient data was provided to justify NFA.

### **Waste Delineation**

In 2006, a waste delineation assessment was performed to identify the limits of the waste at SWMU 66. The assessment used electromagnetic and ground penetrating radar surveys, supplemented by numerous test pits, to evaluate the extent of the former landfill (Tetra Tech NUS, Inc., 2007b). The results of this assessment have since been used to show the approximate boundaries of SWMU 66 (see **Figure 2**).

### **Phase II RFI**

In 2007, a Phase II RFI was performed that included installing and sampling an additional monitoring well located northeast of the landfill and collecting surface water and sediment samples from the stream close to the former landfill. Contaminant concentrations in groundwater and surface water were either below screening criteria or at concentrations that did not adversely impact human health or ecological receptors. Polynuclear aromatic hydrocarbons were detected in sediment within the concrete-lined section of Golf Course Creek, with the highest concentrations detected in samples collected adjacent to Arthur Drive, upgradient and east of the landfill (see **Figure 2**). The Phase II RFI also included a baseline risk assessment to evaluate the potential risks to human and ecological receptors. The human health risk assessment (HHRA) and screening level ecological risk assessment (SLERA) indicated no risks associated with human exposure or threats to ecological receptors. The Phase II RFI Report recommended NFA for site soil, surface water, and sediments and the continued monitoring of groundwater to confirm that waste at the site was not impacting groundwater (Tetra Tech NUS, Inc., 2007a).

### **Periodic Monitoring**

Periodic groundwater monitoring was initiated at SWMU 66 in 2008. Inspection of historic analytical results indicates that the concentrations of metals (i.e., aluminum, arsenic, lead, and manganese) have fluctuated at irregular intervals above and below their HHSLs during the period of record. Nevertheless, all concentrations remained below the established Base background levels for metals (SCDHEC, May 15, 2000). Although no COCs were identified, periodic monitoring continues to confirm that waste left in place has not impacted groundwater.

### **Phase III RFI**

In 2014, a Phase III RFI was performed to resolve a data gap at SWMU 66, where monitoring well 66-MW4-11 was installed southwest and hydraulically upgradient of the former landfill so that the monitoring well network extended around the entire landfill perimeter (see **Figure 2**). One round of groundwater sampling was conducted during July 2014 following installation of new well 66-MW4-11; the one new and four existing wells (66-MW4-7, 66-MW4-8, 66-MW4-9, and 66-MW4-10) were sampled and analyzed for metals. Note that wells 66-MW-4-1, 66-MW-4-2, 66-MW-4-3, 66-MW-4-4, 66-MW-4-5, and 66-MW4-6 were previously abandoned. **Figure 2** shows the locations of existing and abandoned wells. The results of the 2014 monitoring well sampling event indicated none of the metals concentrations exceeded their established Base background concentrations (SCDHEC, May 15, 2000). A risk screening was conducted during the Phase III RFI and results confirmed 2007 Phase II RFI risk assessment results (Tetra Tech

NUS, Inc., 2007a) that SWMU 66 did not pose an unacceptable risk to potential receptors. The Phase III RFI Report recommended performing a Focused CMS. A Focused CMS is normally performed when the scope of a remedy is very narrow or a presumptive remedy is being evaluated. A presumptive remedy, LTM with LUCs, is being evaluated for SWMU 66. Following approval of the Focused CMS, a SoB should be developed for the site and the Permit amended with the recommended final remedy (URS, 2015).

In a letter dated February 12, 2015, SCDHEC concurred with the recommendation to perform a Focused CMS that would serve to further protect human health and the environment with the condition that a combined Focused CMS be prepared and submitted for SWMU 66 and SWMU 67 (SCDHEC, 2015).

### **Focused CMS**

A Focused CMS for SWMU 66 evaluated presumptive remedial alternatives that serve to protect human health and the environment, support preparation of a SoB, and support implementation of a final remedy. The alternatives evaluated included No Action and LTM with LUCs; LTM with LUCs was selected as the proposed remedy (URS, 2017). In a letter dated May 18, 2017, SCDHEC concurred with LTM with LUCs as the proposed remedy.

### **SUMMARY OF SITE RISKS**

Based on the findings presented in the Phase III RFI Report (URS, 2015), no COCs were identified in groundwater at SWMU 66. Maximum detected concentrations for all constituents were below Base background levels, with the exception of molybdenum, strontium, tin, and titanium, for which background levels were unavailable. However, the maximum concentrations of molybdenum, strontium, and tin were below their respective HHSLs. For titanium, neither Base background levels nor HHSLs were identified. Thus, titanium represents an uncertainty and no qualitative or quantitative assessment of potential human health risk from exposure can be made.

Since SWMU 66 is a former landfill with waste left in place, SCDHEC requires some level of long term management to verify that the waste does not release contaminants above concentrations that pose a risk to human health or the environment. Additionally, groundwater at SWMU 66 is not used, nor is it projected to be used, as a drinking water source in the foreseeable future, thereby representing an incomplete exposure pathway (Note: Per SCDHEC Regulation R.61-68.H, all South Carolina groundwater is classified Class GB and is considered to be a potential source of drinking water).

An ecological risk assessment at SWMU 66 was conducted during the Phase II RFI (Tetra Tech NUS, Inc., 2007a) that concluded risks to ecological receptors were minimal. Additional groundwater data have been collected at SWMU 66 as part of ongoing LTM and Phase III RFI activities. Consistent with the Phase II RFI Report, groundwater remains an incomplete exposure pathway and risks to ecological receptors are expected to remain minimal as stated in the original SLERA (Tetra Tech NUS, Inc., 2007a).

### **DESCRIPTION OF ALTERNATIVES**

The Phase III RFI Report for SWMU 66 did not identify any COCs in groundwater (URS, 2015). Because waste remains in place, and there is a concern that waste could affect future metals concentrations in groundwater, the following actions were evaluated in the Focused CMS (URS, 2017):

- Alternative 1 - No Action
- Alternative 2 – LTM with LUCs

Detailed information for each alternative evaluated is provided in the Final Focused CMS and Annual Groundwater Monitoring Report for SWMU 66 – LF004 – Landfill Area No. 1 and SWMU 67 – LF017 – Landfill Area No. 2 (URS, 2017) and summarized below.

#### **Alternative 1 – No Action**

The No Action alternative provides a basis for comparing existing site conditions with those resulting from the implementation of the other alternatives considered.

#### **Effectiveness**

This alternative results in no additional risk reduction at the site. Under the No Action alternative, constituent concentrations may change over time, but under a No Action alternative this would not be

confirmed or evaluated because monitoring would not be performed. The change in concentrations is not monitored or documented, making it impossible to determine when remediation goals have been met or whether site conditions have changed. The presence of waste left in place makes this alternative ineffective.

#### Implementability

This alternative is technically and administratively implementable as no engineering or administrative procedures are required. No capital expenditures or operation and maintenance costs are associated with the No Action alternative.

### **Alternative 2 – LTM with LUCs**

LUCs refer to a broad range of either institutional or engineering controls of the property. LUCs can include institutional controls such as governmental controls, proprietary controls, informational devices, or active land or construction management by the property owner. LUCs can include engineering controls such as site controls and land maintenance. The Base Remedial Project Manager (RPM) works with the 628 Civil Engineer Squadron Base Community Planner (Base Community Planner) to confirm that LUCs are implemented and enforced at applicable sites.

Active land or construction management controls include the specification of protocols for projects planned to occur within the boundaries of a site while under control of the property owner. At the Base, the RPM will review any project plans that may disturb the selected area evaluated. This review will take place prior to proceeding with any new construction or maintenance activity. The review is initiated when the JBCA Civil Engineer Squadron processes a dig permit where the RPM is one of the required approvers. If land disturbing activities impact an ERP site, the RPM will contact SCDHEC for notification as specified in the Permit. The RPM will also review plans for projects located at a site to determine if additional protections are needed for construction workers or the surrounding environment. In addition, the development and implementation of a health and safety program may be required for activities taking place at a site.

Engineering controls may include barriers, such as the existing fence, to prevent access to the site. Vegetative control devices, such as the use of an existing grass cover to limit exposure and/or transport of soils, may be used as an alternative barrier to a specific media of concern.

LTM activities may include the inspection of in-place control devices at a site or periodic sentinel groundwater monitoring to confirm the assumptions of the risk assessment (i.e., no change in current land use and groundwater is not used as a drinking water source) and the resulting conceptual site model (CSM) are still intact.

#### Effectiveness

LUCs prevent exposure to the site by limiting the ability of people to gain access to the site, thereby minimizing or preventing contact with COCs. LUCs do not directly provide on-site restoration, but could reduce the potential for human exposure by preventing land use that could result in exposure to impacted soil and/or groundwater. Because JBCA is an actively managed facility with environmental management, LUCs such as construction permitting reviews, identification of potentially impacted areas, and periodic inspections by JBCA personnel can be very effective at minimizing or eliminating personnel contact with impacted areas of the installation. LUCs presented in the SCDHEC-approved CMS (URS, 2017), such as a vegetative cover, and groundwater monitoring are currently in place and have proven to be effective for both JBCA personnel and the general public.

#### Implementability

LUCs are either already in place or planned at the site as follows:

- Vegetative cover
- Land use restrictions (i.e., no residential, commercial, or industrial development and no use of groundwater) through the Base RPM and Base Community Planner
- Construction management review and planning, including construction permitting reviews, dig permits, and identification of impacted areas by logging the area boundaries into the Base geographic information system
- Environmental management reviews, including annual landfill cover inspections and maintenance activities

## EVALUATION OF ALTERNATIVES AND SELECTION OF THE PROPOSED REMEDY

A summary of the evaluation for the above-referenced alternative scenarios, including estimated costs, are presented on **Table 1**.

The proposed selected Final Remedy at the site is implementing a LTM program very similar to that which is already performed at the site. The specific program includes LTM with LUCs:

- LUC No. 1: Logging the LUC boundaries (inclusive of all polygon coordinates) and use restrictions into the Base geographic information system to officially identify the site as being impacted by waste left in place and to prompt RPM reviews of any proposed disturbance or new use of the site. The review is initiated when the JBCA Civil Engineer Squadron processes a dig permit where the RPM is one of the required approvers. If land disturbing activities impact an ERP site, the RPM will contact SCDHEC for notification as specified in the Permit.
- LUC No. 2: Continuing annual landfill cover/cap inspections and maintenance of necessary items such as erosion and removal of nuisance trees. Identified exposed debris will also be covered with soil contained within the areal extent of SWMU 66. General surface conditions will be restored such that it promotes good drainage, including the cover soil source area.
- Performing groundwater monitoring at the SCDHEC-required frequency, which is currently on an annual basis. The current sampling network consists of wells 66-MW4-7, 66-MW4-8, 66-MW4-9, 66-MW4-10, and 66-MW4-11. Groundwater samples collected from the monitoring wells will be analyzed for Target Analyte List metals, currently including aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, strontium, thallium, tin, titanium, vanadium, and zinc. The purpose of the sentinel monitoring is to provide assurance that potential additional releases from the landfill not identified during the RFI do not adversely affect the CSM and expose potential receptors to unacceptable risks. However, even if additional releases occur, the LUCs being imposed as part of this remedy will be protective of human health and the environment. Periodic groundwater analytical results will be evaluated using screening criteria in place at the time of each sampling event to assess remedy effectiveness. Since no COCs have been identified for this site, the eventual monitoring frequency should be evaluated for reductions. A Corrective Measures Implementation (CMI) Work Plan will be developed to articulate the exact monitoring schedule. CMI Progress Reports (i.e., LTM Reports) will recommend future reductions, including removal of a particular analytic suite, etc., for SCDHEC approval. The recommendations will be based on the collection of sufficient data over time to justify the reductions.
- At a minimum, a yearly report will be submitted summarizing the field events that took place at the site during that year. In some cases it may be an inspection letter/report. In other cases it will also include the reporting of groundwater samples collected. The report will also discuss if there has been a Change in Land Use during the reporting period.
- The selected remedy will be re-evaluated in a Revised CMI Work Plan if the selected remedy is judged to be ineffective, such as new constituents are identified at concentrations posing a risk to human health and/or the environment.

## STATUTORY AUTHORITY

This document is being issued pursuant to Section 44-56-10 et seq. Regulation 61-79 of the 1976 South Carolina Code of Laws, as amended. The JBCA Corrective Action Program is conducted under the authority of Sections 3004 (u), 3004 (v), 3005(c)(3), 3008(h), 3013, 6001, and 7703 of RCRA (42 United States Code 6901 et seq.) as amended by the Hazardous and Solid Waste Amendment of 1984 (Pub. L. No. 98-616, 98 Stat. 3221) and the Federal Compliance Act of 1992 (Pub. L. J02-386, J06 Stat. 1505). This SoB is part of the corrective action process and is a requirement of RCRA Part B Permit # SC8 170 022 620, issued to JBCA by SCDHEC.

## REFERENCES

Engineering Science, 1983. Installation Restoration Program Phase I - Records Search (Preliminary Assessment), Charleston Air Force Base, South Carolina, October 1983.

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Versar, 1991. Draft Installation Restoration Program – Stage 2, Remedial Investigation/Feasibility Study Report, Charleston Air Force Base, South Carolina, October 1991.

## FIGURES



## TABLE